

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

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Abstract

Background: The quality of care provided to children undergoing orthopedic surgery is directly impacted by nurses' competency; therefore, competency-based training programs could be modified to help with transitions and ensure better outcomes. **The study aim** was to evaluate the effect of training program on nurses' competency level regarding care of children undergoing orthopedic surgery. **Study design** A quasi- experimental with pre and post intervention. **Sample:** A convenient sample of all available nurses (n=40) and purposive sample of children (n=40) undergoing orthopedic surgery in Pediatric Surgical Department at Benha Specialized Pediatric Hospital. **Tool (I): A structured interviewing questionnaire sheet:** It included **Part1:** Personal characteristics of studied nurses, **Part2:** Personal characteristics of children, **Part3:** Nurses' knowledge regarding care of children undergoing orthopedic surgery. **Tool (II):** Observational checklist regarding nursing care of children undergoing orthopedic surgery. **Tool (III):** Nurses' Competence Scale. **Tool (IV):** Nurses' attitude regarding competency-based training. **Results:** regarding nurses' care of children undergoing orthopedic surgery at post training program phase the study result showed that, most of the studied nurses had satisfactory knowledge, (87.5%) of them had competent practice and a positive attitude. In addition to, (92.5%) of them had competent level of total competency. **Conclusion:** The majority of the studied nurses had satisfactory knowledge, competent practice, positive attitude, and competent level of competency about care of children undergoing orthopedic surgery at post training program application. **Recommendations:** Implementing competency-based training program in various settings to enhancing the nursing staff's level of expertise in providing care for children undergoing orthopedic surgery.

Keywords: Children, Competency-based Training Program, Nurses' Competency level, Orthopedic Surgery.

Introduction

Professional competency assists nurses in their work performance. As, competence improves nursing care and education. Incompetent nurses may be more likely to experience frustration and dissatisfaction at work. Nurses must be strengthened and trained in order to provide better nursing care (Karami et al., 2022).

Nursing competency is an essential requirement for providing high-quality nursing care. Competency in clinical nursing refers to the state of being qualified and competent in cognitive, clinical, psycho-physical, critical thinking, and decision-making abilities as well as the capacity to improve learning through clinical and academic knowledge that results in safe and optimal patient care (Sharghi et al., 2019).

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Skeletal injuries in children and adolescents have increased significantly. This could be attributed to an increase in the use of motor and high speeds wheeled vehicles within this age group. It is critical to understand the underlying skeletal distinctions between children and adults, as well as the typical symptoms and signs of fractures, strains, sprains, and dislocations in children, as well as the early treatments and management of these injuries (**Walter & Glen, 2022**). Pediatric orthopedic surgeries can be used to treat a wide range of orthopedic disorders in children. Kyphosis, scoliosis, tumors, fractures, and a variety of other diseases, injuries, bone abnormalities, and congenital disorders are examples of these problems (**Garin., 2020**).

Pediatric orthopedic surgeries include noninvasive methods such as splints, casts, and orthotics as well as surgery. When performing surgical procedures on a child versus an adult, a different strategy is usually required. Children's bones are still growing, thus extreme caution should be exercised when working on or near a growth plate. While surgery is always invasive, there are several minimally invasive procedures that can help children recover faster and spend less time in hospitals (**Basques et al., 2022**). The goals of pediatric orthopedic surgery are to minimize pain, maximize movement, balance, and coordination, and improve the child's quality of life by restoring function as soon as possible. Preventing problems including dislocations of the hip, contractures, and the advancement of scoliosis is another main indication for orthopedic surgery (**Sharan., 2021**).

Because of nurses' clinical competence, they hold a vital role in the healthcare system, especially in the pediatric orthopedic surgery department. The quality of

care delivered by nurses and their clinical competency are closely related. In light of the ongoing advancements in medical technology, it is imperative that nurses enhance their clinical competency to guarantee the safety and quality of care provided to children. (**Ghanbari et al., 2017**).

Nursing competency is the ability of a nurse to effectively exhibit a range of qualities, including professional knowledge, personal traits, values, attitude, and skills as well as to carry out professional responsibilities through practice. The application of competency statements, outcome protocols, standards of practice, and experiences to consistently guarantee the delivery of high-quality nursing care helps to close the knowledge gap between nursing education and practice. In order to help children have normal lives and meet all of the needs of children and their families, basic knowledge, skills, and competencies are necessary for nurses (**Habibzadeh et al., 2021**).

Clinical competences can be classified into two groups: general and specific. General clinical competencies involve giving primary care, acquiring basic cultural features, managing well, communicating well, following professional principles, and working in a team. Among the specific competency skills are the ability to monitor health and illness and evaluate nursing care's quality (**Ghanbari et al., 2017**).

Preventing surgical complications is a major responsibility of the nurse. Nurses are in a unique position as advocates to guarantee that children receive high-quality, efficient, and cost-effective care. In order to provide a safe environment for children, it is imperative that staff members possess the required tools, knowledge, and competences. A key component of developing staff's specific

expertise and skills is staff development training (**Brindon, 2022**).

Nurses have an essential proactive role in avoiding complications and promoting healing, and emotional support may be critical in assisting children in coping with the changes caused by musculoskeletal injuries. Nursing evaluation should include not just the injured part but additionally the functionality of other systems that may be impacted, such as the musculoskeletal, gastrointestinal, circulatory, and renal systems (**Penasales et al., 2021**). After any pediatric orthopedic surgery, the postoperative orthopedic nurse is primarily responsible for providing care. This includes close monitoring and care in the initial postoperative period, regular daily monitoring, and administration of the care plan, which helps shorten the hospital stay (**Wilson, 2016**).

Significance of the Study:

Competency-based nursing education is an approach to assess, design, implement, and evaluate nursing educational programs. This is accomplished through the use of a competency framework. The promotion, maintenance, and rehabilitation of health are vital tasks for nurses. It is essential to train competent nurses who can assume expanded roles in the provision of healthcare. The competency of nurses has a direct impact on the quality of care delivered to children having orthopedic surgery, while also lowering the cost of care. As a result, competency-based training programs could be modified to assist with transitions and to ensure better outcomes (**Sargeant et al., 2018**). Therefore, the purpose of this study was to assess how a training program affected the nurses' level of competency in providing care for children having orthopedic surgery.

Aim of the study

Evaluating the effect of training program on nurses' competency level regarding care of children undergoing orthopedic surgery.

Research Hypotheses:

The training program will be expected to improve nurses' knowledge, practice, attitude and their competency level regarding care of children undergoing orthopedic surgery.

Subjects and method

Research design:

A quasi-experimental with pre / post-intervention.

Research setting:

The research study was performed in the Pediatric Surgical Department at Benha Specialized Pediatric Hospital which affiliated to the General Secretariat and Medical Centers. It located on the second floor and made up of 7 rooms; 6 rooms for surgery which contain twenty-one beds and one room for one day surgery which contain eighteen beds.

Sample:

1- The sample of the study was a convenient sample consisting of all nurses who worked in selected setting regardless their personal characteristic (40 nurses).

2- A purposive sample of children (n=40) from the preceding described setting throughout the study period under the following **criteria of inclusion:** their age from 1-15 years and undergoing orthopedic surgery. **The study excluded** children having hydrocephalus, spina bifida, and children with relapsed after orthopedic surgery.

Tools of data collection:

Tool I: A structured Interviewing Questionnaire Sheet: To gather data,

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

researchers formed this tool, which is written in clear Arabic. It comprised of the following items:

Part 1: Personal characteristics of studied nurses. It comprised 5 multiple-choice questions. It included educational qualification, age, years of experience, gender and the attainment of previous training program regarding care of children undergoing orthopedic surgery.

Part 2: Personal characteristics of children and medical record: It comprised age, type of orthopedic surgery, gender, investigations, and history of previous orthopedic surgery (5 questions).

Part 3: Nurses' knowledge regarding care of children undergoing orthopedic surgery: It adapted from **Basques et al., (2022) & Al-Barwari et al., (2019)**, it included of 11 questions with multiple choice concerning orthopedic surgery as (definition, types, indications, contraindications, advantage, disadvantage, complications, preoperative and postoperative nursing care, prevention of postoperative complications, and health education for the care giver and discharge planning).

Scoring system of nurses' knowledge:

To compare the answers from the nurses under study, the model key answers were utilized. Two marks were given for a correct and complete answer, one for a correct but incomplete answer, and zero for a wrong or unknown answer. Overall knowledge ratings ranged from (0 - 22) point for total (11) questions for nurses' knowledge, as a result, the overall knowledge score was assigned the following classification:

- **Satisfactory:** $\geq 85\%$ was ranged from (19 \leq 22) points.

- **Unsatisfactory:** $< 85\%$ have less than 19 points.

Tool II: Observational checklist regarding nursing care of children undergoing orthopedic surgery.

It was adopted from **Pathak & Ayoub-Rodriguez, (2021) & Young et al., (2010)**, to evaluate nurses' practice regarding preoperative care, immediate and post operative care for children undergoing orthopedic surgery, it contained 37 steps grouped under three main procedures; preoperative care (8 steps), immediate postoperative care (10 steps), and postoperative care (19 steps).

Scoring system of nurses' practice:

The researchers determined the overall practice score for nurses. Every item was graded with one point for done and correct, and zero for not done. In light of this, the overall practice score was categorized as follows:

- **Competent:** 100% of total nurses' practice score, 37 points.
- **Incompetent:** $< 100\%$ of total nurses' practice score, ranged from (0- $<$ 37) points.

Tool III: Nurse Competence Scale (NCS).

The nurse competence scale was adapted from **Notarnicola et al., (2018) & Meretoja et al., (2004)** to evaluate the competency level of nurses in managing the care of children who have orthopedic surgery, it adjusted by the researchers to fit with the goals of the study. The 32 steps in the nurse competency scale were divided into seven categories as helping role (4 steps), teaching- coaching (8 steps), diagnostic functions (6 steps), managing situations (6 steps), therapeutic

interventions (2 steps), ensuring quality (3 steps) and work role competencies (3 steps).

Scoring system of nurses' competency:

A Visual Analog Scale ranging from 0 to 100 was used to assess the level of nurses' competence. The ranges were: low competence 0- 25, quite competence 25-50, good competence 50-75, and very good competence 75-100. A four-point rating system indicates how frequently each item is used in clinical practice: not applicable to a nurse's work had score (1), used very seldom (2), used occasionally (3), and used very often (4). Consequently, the competency level of nurses was classified as competent (≥ 85) and incompetent (< 85).

Tool IV: Nurses' attitude regarding competency-based training. It was adapted from **Fathi et al., (2021)**, it is 5-point Likert scale used to measure nurses' attitude regarding competency-based training. It translated to Arabic and included (7) items such as competency-based training is required for nurses; to increase their quality of care, allows nurses to be collaborative, flexible, more active, engaged, and productive for providing optimal nursing care for children undergoing orthopedic surgery, improves nurses' ability in optimal nursing care planning & application, improves crisis management in the future for healthcare issues., fit work requirements and enhance it without errors which is a necessary for prevention of orthopedic surgery complications, & follow competency steps easily during care of children undergoing orthopedic surgery. Nurses' response scored as strongly agree had grade 4, agree had grade 3, neutral had grade 2, disagree had grade 1, and strongly disagree had grade 0.

Scoring system of nurses' attitude

The total score of nurses' attitudes ranged from (0-28) points.

- **Negative attitudes** ($< 75\%$)
- **Positive attitudes** ($\geq 75\%$)

Operational Design:

It comprised of the following items:

Preparatory Phase: Using books, articles, periodicals, journals, and the internet on a national and worldwide, this phase involved reviewing pertinent literature and theoretical parts of the numerous study topics to design study tools and become equipped with the different facts of the research problems.

Content validity:

Data collection instruments were translated into Arabic and examined for content validity by three experts in pediatric nursing from Faculty of Nursing, Benha University who analyzed its accuracy, simplicity, relevancy, clarity, and comprehensiveness. Every one of their comments was considered, and some of them were modified to make the final instruments.

Reliability:

The Cronbach's alpha coefficient test was used to assess the tools' reliability. The results showed that the nurses' attitude was 0.79, nurse practice was 0.85, and the knowledge evaluation questionnaire had a score of 0.72.

Ethical considerations:

Ethics clearance issued by the Scientific Research Ethical Committee of Faculty of Nursing, Benha University code (REC.PN.P47). Before any data was collected, the nurses under study provided their informed consent. Nurses received assurances about the study's safety and the confidentiality and exclusive use of any data gathered for research purposes. Additionally, the nurses are free to quit the study at any moment.

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Pilot study:

A preliminary investigation was carried out to evaluate the clearness and applicability of the research instruments and to approximate the duration required for every instrument. Sample bias and contamination were prevented by excluding four nurses and four children who were having orthopedic surgery, making up 10% of the total participants. The final version was developed after modifications were made in light of the analysis of the pilot research.

Field of Work:

The training program was delivered from the start of January until the end of March 2024, through the following phases.

Assessment phase.

Nurses were interviewed during the assessment phase in order to get baseline data. The researchers worked morning and afternoon shifts on Saturday and Wednesday, two days a week, and it took roughly two weeks. Researchers gathered information from medical records about children having orthopedic surgery, and it took over fifteen minutes for each child. The nurses under study were given a questionnaire by the researchers to complete; it took them fifteen minutes to complete. Using an observational checklist and the nurses' competence scale, each nurse was observed individually while they were performing procedures to determine their degree of proficiency, it took 30 minutes. Likert scale sheet that used to measure nurses' attitude regarding competency-based training distributed by the researchers to the studied nurses, and it took 10 minutes to be completed.

Planning phase.

The training program was prepared by the researchers considering the nurses' level of knowledge in simple Arabic language, as well as collected data from the assessment

phase and pertinent literature evaluation. A variety of teaching techniques were employed, including group discussions, brainstorming, demonstrations, redemonstrations, and modified lectures. A handout, role play, audio-visual aids, case study, and actual instruments were all considered appropriate teaching media to ensure that nurses understood the material properly.

Implementation phase.

Before the training program began, a briefing on its purpose was given to the nurses, and they were also notified that the sessions would be held in the pediatric surgery unit lecture room at the designated time and location. The training program took roughly five hours to complete for each of the eight groups of five nurses, and it was carried out in accordance with the nurses' readiness, dispersed as follows: there were three sessions for the theoretical portion, lasting between thirty and forty-five minutes each, and three sessions for the practical section, lasting an hour each. The program's implementation took around eight weeks.

Theoretical portion; the first session of program included an overview on pediatric orthopedic surgery as definition, indications, contraindications, advantage, disadvantage, complications, and treatment **the second session** included types of pediatric orthopedic surgery such as corrective surgeries (clubfoot correction limb lengthening, & correction of bowlegs or knock-knees), spine surgeries, (scoliosis correction, & correction of spinal deformities), joint surgeries (hip dysplasia correction, joint reconstruction), fracture repairs (fracture reduction and fixation), tumor surgeries (tumor excision), and surgery for cerebral palsy, **the third session** focused on preoperative, immediate and postoperative nursing care.

Practical portion: the first session included the application of preoperative, immediate, and postoperative care of children undergoing orthopedic surgery. **The second session** focused on application of competency steps at care of children having orthopedic surgery it included steps of helping role of nurses for children undergoing orthopedic surgery and their families, steps of teaching – coaching, and steps of diagnostic functions, **the third session** included steps of managing situations, steps of providing optimal therapeutic intervention, steps of ensuring nursing care quality for children who undergoing orthopedic surgery and steps of work role competency. Every group of nurses received an explanation of these sessions separately.

Evaluation phase:

Using the same pretest instruments as before, a posttest was administered to evaluate nurses' practice, knowledge, and level of competency in caring for children who undergoing orthopedic surgery as well as their attitudes toward competency-based training following program implementation, and it took 2 weeks.

Administrative design:

The head of the pediatric surgery units and hospital directors at the Specialized Pediatric Hospital in Benha City received formal permission from the dean of the nursing faculty at Benha University. In order to successfully carry out the study with the least amount of resistance, a description of its purpose, significance, and predicted results were provided.

Statistical analysis:

Version 21 of (SPSS) was employed to coordinate, tabulate, and statistically analyze the acquired data. For qualitative factors, the data were shown as numbers and percentages, and for quantitative variables, as mean and

standard deviation. The paired t test was used to compare quantitative continuous data. Both the Fisher exact test and the Chi-square test were employed for qualitative variable comparison. To evaluate the relationships between the quantitative variables, Pearson correlation analysis was performed.

Results:

Table (1): Shows that; Less than half (42.5%) of nurses were in the age group 25-<30 years with average age 25.72 ± 4.56 years. Concerning gender, majority (82.5 %) of studied nurses were females. Also, educational qualification, more than two thirds (70.0 %) of nurses had technical institute of nursing certificate. Meanwhile, half (50.0%) of them had 6-<9 years of experience in orthopedic surgery pediatric department with mean 6.97 ± 2.73 years. And 72.5% of them had no training courses related to caring for a child undergoing orthopedic surgery.

Table (2): Reveals that, 60.0 % of studied children had 1- < 5 years with mean age 5.20 ± 3.09 years. Meanwhile, gender 57.5% of them were males and regarding type of orthopedic surgery more than half (52.5) of them had limb lengthening correction.

Table (3): Clarifies that, 77.2% of the studied nurses had incorrect answer at pre-training program, while improved to (90.0%) of them had complete correct answer about nurses' knowledge regarding health education for the care giver and discharge planning at post training program. Moreover, there was a highly statistically significance in all items of studied nurses' knowledge regarding care of children undergoing orthopedic surgery at pre/post training program phases ($p < 0.000$).

Table (4): Shows that, (87.5%) of the studied nurses had incompetent practice at

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

pre- training program, while improved to (92.5%) of them had competent practice regarding care of children undergoing orthopedic surgery at post training program. Moreover, there was a highly statistically significance in all items of studied nurses' practices regarding care of children undergoing orthopedic surgery at pre /post training program phases ($p < 0.000$).

Figure (1): Illustrates that, the majority (82.5%) of studied nurses had unsatisfactory level of total knowledge at pre training program phase. While 90.0% of them had satisfactory knowledge regarding the care of children undergoing orthopedic surgery at post training program phase.

Figure (2): Shows that, the majority (80.0%) of studied nurses had an incompetent level of total practice pre- training program phase. While 87.5% of them had competent practice regarding care of children undergoing orthopedic surgery at post training program phase.

Table (5): Presents that, mean score of the studied nurses' attitude regarding competency-based training program at pre training program was 1.60 ± 0.77 . Which improved to 4.12 ± 1.04 at post training program. Moreover, there was highly statistically significant difference in all items of nurses' attitude regarding care of children undergoing orthopedic surgery at pre and post training program phases ($p < 0.000$).

Table (6): Reveals that, mean score of the studied nurses' competency level regarding diagnostic functions at pre training program 50.10 ± 5.64 . Which improved to 92.05 ± 5.27 at post training program. Moreover, there was highly statistically significant difference in all items of nurses' competency regarding care of children

undergoing orthopedic surgery at pre / post training program phases ($p < 0.000$).

Figure (3): Shows that, 77.5% of studied nurses had a total negative attitude at pre- training program phase. While 87.5% of them had a positive attitude regarding care of children undergoing orthopedic surgery at post training program phase.

Figure (4): Shows that, the majority (85.0%) of studied nurses had incompetent level of total competency at pre- training program phase. While the most (92.5%) of them had competent level of total competency regarding care of children undergoing orthopedic surgery at post training program phase.

Table (7): Clarifies that, there was a positive correlation and highly statistical significance between total nurses' knowledge, total practice, and total attitudes scores regarding care of children undergoing orthopedic surgery at pre / post training program phases ($p < 0.000$).

Table (8): Clarifies that, there was a positive correlation and highly statistical significance between total nurses' knowledge, total practice, and total attitudes scores with total nurses' competency level regarding care of children undergoing orthopedic surgery at pre and post training program phases ($p < 0.000$).

Table (1): Distribution of the studied nurses according to their personal characteristics (n=40).

Items	No.	%
Age (years)		
<20	2	5.0
20-<25	16	40.0
25-<30	17	42.5
30-<35	2	5.0
≥35	3	7.5
Mean ± SD 25.72±4.56 years		
Educational qualification		
Secondary school nursing education	2	5.0
Technical institute of nursing	28	70.0
Bachelor degree in nursing science	7	17.5
Post graduate in nursing science	3	7.5
Years of experience in pediatric orthopedic surgery department		
<3	2	5.0
3-<6	10	25.0
6-<9	20	50.0
≥9	8	20.0
Mean ± SD 6.97±2.73 years		
Gender		
Male	7	17.5
Female	33	82.5
Attendance of training courses related to pediatric orthopedic surgery		
Yes	11	27.5
No	29	72.5

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Table (2): Distribution of the studied children according to their personal characteristics (n=40).

Items	No.	%
Age of the child / Years		
1- < 5	24	60.0
5-< 10	12	30.0
10 – ≤15	4	10.0
Mean ± SD 5.20±3.09 years		
Type of orthopedic surgery		
Limb lengthening correction	21	52.5
Congenital clubfoot correction	8	20.0
Correction of bowlegs or knock knee	6	15.0
Fracture repair	5	12.5
Gender		
Male	23	57.5
Female	17	42.5

Table (3): Distribution of the studied nurses according to their knowledge regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40)

Items	Pre training program (n =40)						Post training program (n =40)						X ² FET	P value
	Complete correct answer		Incomplete correct answer		Unknown or wrong answer		Complete correct answer		Incomplete correct answer		Unknown or wrong answer			
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%		
Definition of orthopedic surgery	3	7.5	12	30.0	25	62.5	28	70.0	7	17.5	5	12.5	42.45	0.000
Causes of orthopedic surgery	5	12.5	7	17.5	28	70.0	30	75.0	5	12.5	5	12.5	65.25	0.000
Types of orthopedic surgery	5	12.5	6	15.0	29	72.5	26	65.0	7	17.5	7	17.5	45.65	0.000
Advantages of surgery	4	10.0	9	22.5	27	67.5	31	77.5	5	12.5	4	10.0	56.15	0.000
Disadvantages of orthopedic surgery	3	7.5	4	10.0	33	82.5	34	85.0	4	10.0	2	5.0	91.20	0.000
Contraindication of orthopedic surgery	4	10.0	5	12.5	31	77.5	33	82.5	4	10.0	3	7.5	78.55	0.000
Complications of orthopedic surgery	3	7.5	3	7.5	34	85.0	30	75.5	5	12.5	5	12.5	79.25	0.000
Nurses' knowledge regarding preoperative care	4	10.0	7	17.5	29	72.5	32	80.0	4	10.0	4	10.0	66.22	0.000
Nurses' knowledge regarding postoperative care	2	5.0	4	10.0	34	85.0	35	87.5	3	7.5	2	5.0	76.55	0.000
Nurses' Knowledge regarding postoperative complications	5	12.5	7	17.5	28	70.0	34	85.0	3	7.5	3	7.5	72.35	0.000
Nurses' Knowledge regarding health education for the care giver and discharge planning	4	10.0	5	12.5	31	77.5	36	90.0	2	5.0	2	5.0	92.15	0.000

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Table (4): Distribution of the studied nurses according to their practice regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

Items	Pre- training program (n=40)				Post- training program (n=40)				X ² FEET	p-value
	Competent		Incompetent		Competent		Incompetent			
	No	%	No	%	No	%	No	%		
Practice regarding pre- operative care.	6	15.0	34	85.0	36	90.0	4	10.0	44.60	0.000
Practice regarding immediate postoperative care.	8	20.0	32	80.0	34	85.0	6	15.0	33.40	0.000
Practice regarding postoperative care.	5	12.5	35	87.5	37	92.5	3	7.5	50.90	0.000

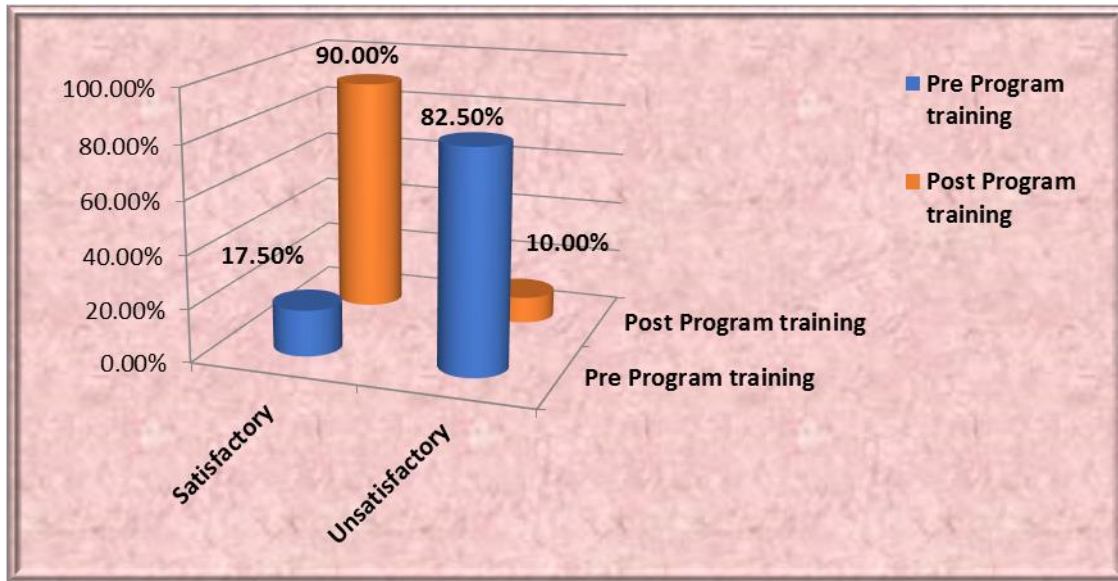


Figure (1): Distribution of total level of the studied nurses' knowledge regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

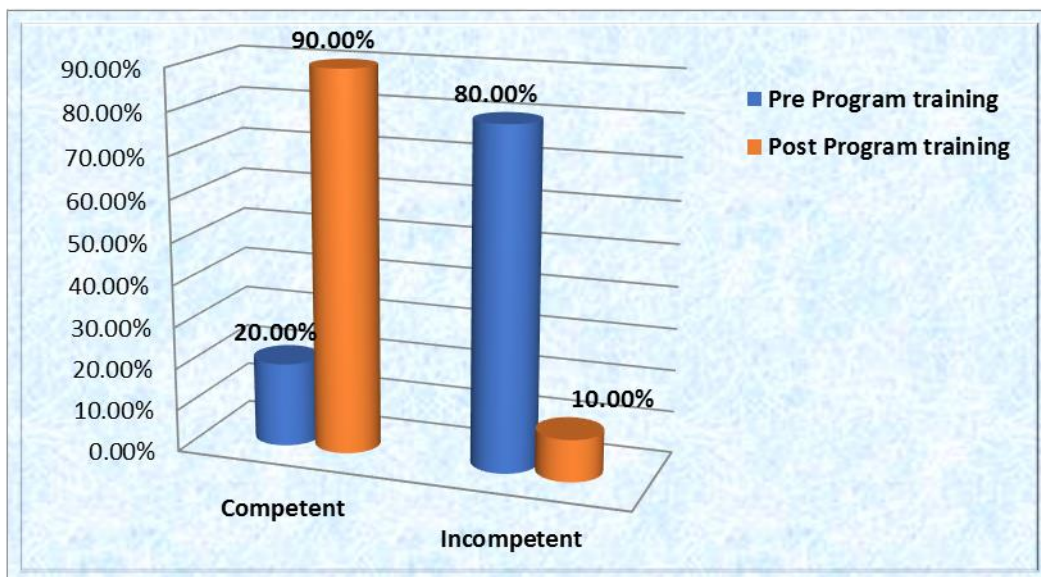


Figure (2): Distribution of total level of the studied nurses' practices regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Table (5): Mean score of the studied nurses' attitude regarding care of children undergoing orthopedic surgery at pre and post training program phases (n =40).

Items	Pre training program g (n =40)	Post training program (n =40)	Paired t test	P value
	Mean ± SD	Mean ± SD		
I feel that competency-based training is required for nurses to increases their quality of care	1.60±0.77	4.12±1.04	38.28	0.000**
I feel that competency-based training allows nurses to be collaborative, and flexible nursing care for children undergoing orthopedic surgery	1.87±1.11	4.07±1.04	34.60	0.000**
I think competency-based training will make nurses more active, engaged, and productive with for providing competent nursing care for children undergoing orthopedic surgery.	1.90±1.12	4.42±0.98	38.43	0.000**
I think that competency-based training improves nurses' ability in optimal nursing care planning & application.	1.92±1.22	3.95±1.28	28.51	0.000**
I appreciate that I should literate competency-based training to have better future management with any healthcare crises.	1.82±1.09	3.90±1.08	33.81	0.000**
I appreciate that competency-based training will fit work requirements and enhance it without errors which is a necessary for prevention of orthopedic surgery complications	2.15±1.02	3.95±1.28	32.24	0.000**
I feel that I will follow competency steps easily during care of children undergoing orthopedic surgery.	2.00±1.32	4.07±1.09	32.57	0.000**
Total	13.26±7.65	28.48±7.79	238.44	0.000**

Table (6): Mean score of the studied nurses' competency regarding care of children undergoing orthopedic surgery at pre and post training program phases (n =40).

Items	Pre training program (n =40)	Post training program (n =40)	Paired t test	P value
	Mean ± SD	Mean ± SD		
Helping role	34.85±9.66	89.32±5.81	97.07	0.000**
Teaching-coaching	49.42±5.67	90.42±5.23	109.10	0.000**
Diagnostic functions	50.10±5.64	92.05±5.27	111.25	0.000**
Managing situations	49.25±6.15	91.47±5.15	112.51	0.000**
Therapeutic interventions	47.97±9.35	90.50±5.77	99.62	0.000**
Ensuring quality	50.47±6.54	86.67±12.34	64.78	0.000**
Work role	42.82±12.34	88.00±7.25	76.67	0.000**
Total	324.88±55.35	628.43±46.82	671.00	0.000**

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

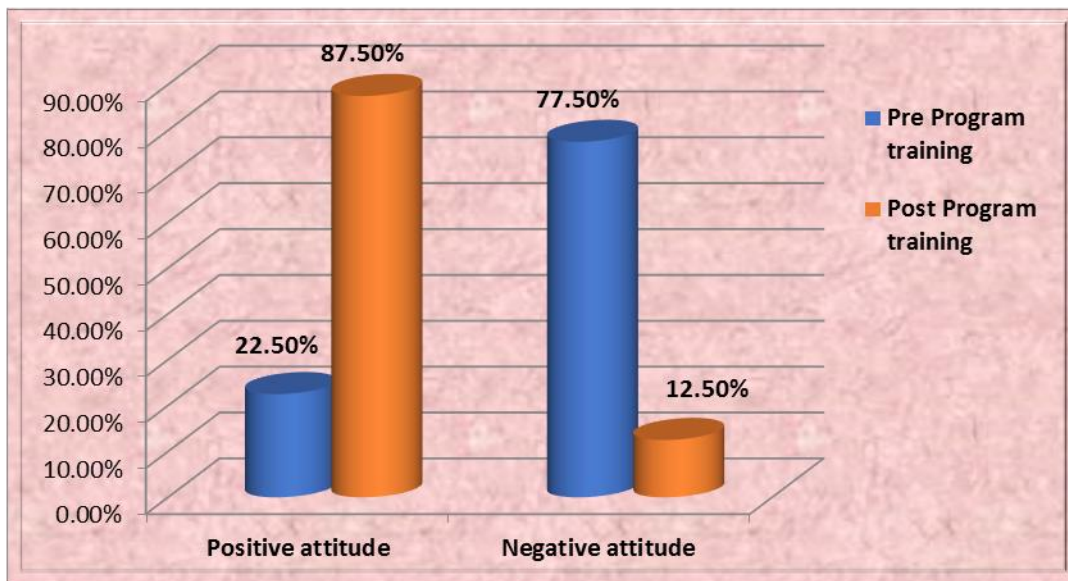


Figure (3): Distribution of total level of the studied nurses' attitude regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

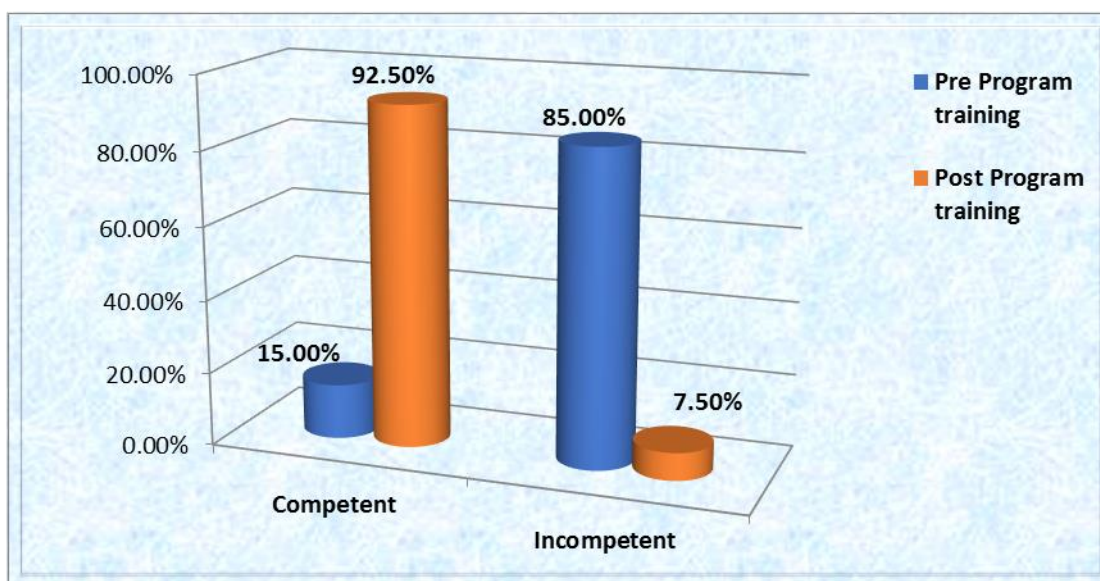


Figure (4): Distribution of total level of the studied nurses' competency regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

Table (7): Correlation between studied nurses' total knowledge, total practice and total attitude scores regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

Total scores	Pearson correlation coefficient			
	Pre training program		Post training program	
	r	P-value	r	P-value
Knowledge - practice	0.724	.000**	0.892	.000**
Knowledge - attitude	0.619	.000**	0.882	.000**
Attitude - practice	0.855	.000**	0.410	.000**

Table (8): Correlation between nurses' total knowledge, total practice, and total attitude with nurses' competency regarding care of children undergoing orthopedic surgery at pre and post training program phases (n=40).

Total scores	Pearson correlation coefficient			
	Total nurses' competency score pre training program		Total nurses' competency score post training program	
	r	P-value	r	P-value
Total knowledge	0.742	.000**	0.854	.000**
Total practice	0.557	.000**	0.753	.000**
Total attitude	0.855	.000**	0.743	.000**

Discussion:

Competence is crucial for continuing education, practices, and certificated programs, particularly in nursing. Nursing ethics need nurses to be capable of providing safe and effective care. Appreciating nursing competencies requires a dynamic blend of knowledge (from basic to specialty), skills (such as assessment, communication, critical thinking, technical proficiency, teaching, and customer service), and abilities (such as caring, professional presentation, and character) (Kohrt et al., 2018). An injury or illness affecting the musculoskeletal system can significantly impair children's ability to

carry out routine activities and may lead to both temporary and permanent disability. A healthy musculoskeletal system is essential to optimal health in a normal, active human being. Thus, the roles that nurses serve are significant and essential in preventing additional injuries, minimize the possibility of problems from immobilization following orthopedic surgery, promote healing, optimize independence, and encourage appropriate rehabilitation (Alexander et al., 2021).

According to characteristics of the studied nurses, the current study clarified that; less than half of nurses had 25-<30 years with 25.72±4.56 years. Concerning gender, majority of studied nurses were females.

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Also, educational qualification, more than two thirds of nurses had technical institute of nursing certificate. Meanwhile, half of them had 6-<9 years of experience in pediatric orthopedic surgery department with mean 6.97 ± 2.73 years. And more than two thirds of them had no training courses related to caring for a child undergoing orthopedic surgery. The study results were consistent with **Hussein et al., (2018)** who indicated that the age range of less than half of the orthopedic nurses was 25 to under 30 years old. Contrarily, the majority of them had experience of at least ten years, and over half had a secondary nursing school qualification.

Conversely, though, these results were disagreed with **Gouda, (2017)** who illustrated that, among nurses, almost half belonged to the age group 25- 30 years, most of the studied nurses (80%) had a diploma level of education and more than two thirds had 11 years or more of experience regarding training courses as he found that none of the nurses under study had ever participated in any prior training sessions. But were in the same line regarding that femals made up the largest proportion of them.

According to characteristics of the studied children, the current study revealed that, more than half of studied children were in the age group 1-< 5 years with 5.20 ± 3.09 years. Meanwhile, males made up over half of them and regarding type of orthopedic surgery more than half of them had limb lengthening correction. This result comes in accordance with **Abd El-Ghani & Mosbeh., (2019)** who reported that, more than half of the children were males. But were contrasts regarding that over half of the children had internal fixation and within the $12 \leq 18$ age range, with an average of 12.3 ± 4.1 years. While, this finding disagreed with **Dermott et**

al., (2021) who reported that, more than half of the studied children were females with average age of 13.7 years.

As regards to total level of the studied nurses' knowledge regarding care of children undergoing orthopedic surgery at pre / post training program phases, the result of the present study illustrated that, at the pre-training program phase, the majority of the studied nurses had unsatisfactory level of overall knowledge. Even though, most of them had satisfactory knowledge regarding care of children undergoing orthopedic surgery at post training program phase. This finding agreed with **Hojatallah et al., (2022)** who highlighted that the program greatly improved levels of nurses' knowledge and practice regarding care of patients having orthopedic surgery.

Similarly, with **Taha & Ibrahim., (2021)** who illustrated that, prior to program implementation, about 75% of the nurses in the study had inadequate total knowledge scores; nevertheless, the majority of them had a sufficient level of knowledge immediately after the program's implementation. According to the researcher, this result could be explained by the fact that the majority of the nurses studied did not have any training in orthopedic pediatric patient care. Also, there is a shortage of protocols, guidelines, and a manual procedure book for the care of orthopedic pediatric patients. Conversely, a sufficient degree of knowledge following educational program implementation indicated that theoretical sessions in the program had a favorable impact on nurses' knowledge, as evidenced by a statistically significant increase in total knowledge across program phases.

Regarding total level of the studied nurses' practices concerning care of children having orthopedic surgery at pre / post training program phases, results of the current study indicated that, the majority of nurses who were studied had incompetent level of total practice pre- training program phase. Even though, the majority of them had competent practice at post training program phase. According to the researcher, this could be attributed to most nurses having insufficient knowledge at pre-training program implementation as well as the decrease of programs for in-service training. Nonetheless, the majority of nurses displayed adequate practice after the training session.

The study result was consistent with **Abd El-Hay et al., (2019)** who stated that the clinical pathway management program resulted in a notable improvement in nurses' practice. Similarly with **Al-Barwari et al. (2019)**, further findings from their study revealed that the nurses' practices are insufficient to care for children with skin traction in an orthopedic department. Additionally, these results were in accordance with **Elkattan and Elderiny (2019)**, who stated that prior to the establishment of nursing care guidelines, all nurses' practice was inadequate. Nevertheless, upon its implementation, almost two-thirds of them demonstrated a sufficient level of practice. Additionally, **Garcia & Fugulin (2022)**, found that the care that orthopedic nurses deliver is the outcome of a connection based on their sensitivity to patients as well as their own expertise, abilities, and attitudes.

Concerning the studied nurses' attitude about care of children having orthopedic surgery at pre and post training program phases, the current analysis revealed that, over than two thirds of the nurses that were studied had total negative attitude with mean

score 1.60 ± 0.77 at pre- training program phase. Although the majority of them had positive attitude regarding care of children undergoing orthopedic surgery with mean score 4.12 ± 1.04 at post training program phase. Moreover, there was highly statistically significant difference in all items of nurses' attitude regarding care of children having orthopedic surgery at pre /post training program phases ($p < 0.000$). This result emphasizes the necessity of providing nurses with consistent support through on-the-job training and continuing education. Also, this finding indicates the favorable outcome of the training program. This result was parallel to **Gouda, (2017)** who revealed that, most nurses respond correctly with the attitude questionnaire and over two thirds of the nurses under study had a positive attitude.

In relation to total level of the studied nurses' competency about care of children having orthopedic surgery at pre/post training program phases, the results of this study indicated that, the majority of studied nurses had incompetent level at pre- training program phase. Even though most of them had competent level at post training program phase with highly statistically significant difference in all items of nurses' competency at pre/post training program phases ($p < 0.000$). From the researcher viewpoint nurses' competency level enhanced after application of the training program for nurses These results were supported by **Abouzaj, (2019)** who stated that, the competency-based approach to nursing education offers a genuine chance to enhance the abilities of recipients and equip them to successfully carry out their professional responsibilities. In addition, the present study findings were parallel to **Imanipour et al., (2021)** who concluded that, when compared to the control group, the clinical performance of the

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

healthcare practitioners in the intervention group is improved by competency-based education.

Regarding correlation between studied nurses' total knowledge, total practice and total attitude scores regarding care of children undergoing orthopedic surgery at pre / post training program phases, the result of the study clarified that, there was a positive correlation and highly statistical significance between total nurses' knowledge, total practice, and total attitudes scores regarding care of children undergoing orthopedic surgery at pre and post training program phases ($p < 0.000$). These results, in the opinion of the researchers, highlight the idea that knowledge levels impact practice levels, and that insufficient or incorrect knowledge makes nursing practices riskier and less effective. This result comes in consistent with **Gouda, (2017)** who found that there was a statistically significant positive association between the nurses' overall knowledge and practice. Also, these findings agree with **Taha & Ibrahim., (2021)** who revealed that, a statistically significant positive correlation between the total nurses' knowledge and their practices pre, immediately post, and three months post-program application. This result settles the positive effect of the program on enhancing nurses' knowledge and practice.

The current study portrayed that, there was a positive correlation and highly statistical significance between total nurses' knowledge, total practice, and total attitudes scores with total level of competency about care of children undergoing orthopedic surgery at pre / post training program phases ($p < 0.000$). This implied that raising nurses' knowledge will enhance their competency level, which will help them master the application of clinical skills, and this will

reflect on the quality of nursing care that children receive. The reason for this could be that nurses' knowledge directly affects their competency level, and nurses' knowledge is necessary to attain the highest degree of competency and provide high-quality nursing care. These findings are strengthened by **Mirlashari et al., (2016)** who noticed that, there is a direct statistically significant correlation between the level of clinical competence and nurses' level of knowledge and practice. In addition to in consistent with **Hassankhani et al., (2018)** who discovered that there was a positive link between the regularity with which clinical skills are applied and the degree of competency ($P < 5.551$). Moreover, the finding of this study was matched with **Grondahl et al., (2019)** who showed that there was a positive relationship between knowledge and the quality of surgical nursing care.

Finally, Competency of the nurses is a crucial requirement for delivering children with healthcare. The change in the responsibilities and duties of nurses has made their work more complex, requiring a variety of abilities, and has made clinical competence more valuable. Competencies are defined as a complex system of attitudes, knowledge, and abilities that support effective problem-solving and task completion. It is a key element of nursing care, which also has a significant impact on the standard of care given by nurses, increasing efficiency and productivity in professional work settings (**Faraji et al., 2019**).

Conclusion:

The majority of the studied nurses had satisfactory knowledge, competent practice, positive attitude, and competent level of competency about care of children

undergoing orthopedic surgery at post training program application. Which indicated that the training program increased competency level of the studied nurses.

Recommendations:

- Continuing education programs for nurses to keep them up to date with knowledge and practice regarding care of children undergoing orthopedic surgery.

- Implementing competency-based training programs in various settings to raise the nursing staff's level of expertise in providing care for children undergoing orthopedic surgery.

- Conducting further studies, for the purpose of generalization the obtained results, on a larger random sample in an alternative setting in Egypt.

References:

- Abd El-Hay, S. A., Basal, A. A., & El-Fors, E. S. M. (2019).** Effect of Implementing Clinical Pathway Management Program for Patients undergoing Fracture Neck Femur Surgery on Nurses' Knowledge, Practice and its' Designing. Practice and its' Designing.
- Abouzaj, S, (2019).** Competency-Based Approach in Training Nurses and Midwives in Morocco Demystify to Better Use Vol.10: 1069 -1079.
- Abd El-Ghani, N. A., & Mosbeh, A. N., (2019).** Effect of Postoperative Immobility on Children with Musculoskeletal Injuries. Egyptian Journal of Health Care, 10(4), 205-218.
- Al-Barwari, R., Al-Attar, W., Saeed, O. (2019).** Evaluation of Nursing Knowledge and Practices Concerning Nursing Care of patient with Skin Traction in Orthopedic Units Kurdistan Region, Sci. J. Nursing / Baghdad 19(2): 24-31
- Alexander, M., Nicol, M., Brooker, C. (2021).** Alexander's Nursing practice. Hospital and Home, The adult,4th ed., China, Elsevier health science. P338.
- Basques, B. A., Lukasiewicz, A. M., Samuel, A. M., Webb, M. L., Bohl, D. D., Smith, B. G., & Grauer, J. N. (2022).** Which pediatric orthopedic procedures have the greatest risk of adverse outcomes? Journal of Pediatric Orthopedics, 37(6), 429-434.
- Dermott, J. A., Wright, F. V., Salbach, N. M., & Narayanan, U. G. (2021).** Development of the gait outcomes assessment list for lower-limb differences (GOAL-LD) questionnaire: a child and parent reported outcome measure. Health and Quality of Life Outcomes, 19(1), 139.
- Elkattan, B. A. A., & Elderiny, S. N. M. (2019).** Effect of nursing care guidelines on preventing deep venous thrombosis among patients undergoing arthroplasty surgery, International Journal of Novel Research in Healthcare and Nursing, 6(2), 757-774.
- Fathi, A.I., Atiya, M. G., & Ramadan, S. M., (2021).** The Effect of Instructional Intervention about Competency-Based Nursing Education on academic's knowledge, planning skills, and their acceptance during COVID Pandemic. Egyptian Journal of Health Care, 12(4), 123-149.
- Faraji, A., Karimi, M., Azizi, S. M., Janatolmakan, M., & Khatony, A. (2019).** Evaluation of clinical competence and its related factors among ICU nurses in Kermanshah-Iran: A cross-sectional study. International journal of nursing sciences, 6(4), 421-425.

The Effect of Training Program on Nurses' Competency Level regarding Care of Children Undergoing Orthopedic Surgery

Garcia, P., Fugulin, F. (2022). Nursing care time and quality indicators for adult intensive care: correlation analysis 20(4):651-659.

Ghanbari, A., Hasandoost , F., Lyili, E., Khomeiran, R. and Momeni, M. (2017). Assessing emergency nurses' clinical competency: An exploratory factor analysis study. Iranian journal of nursing and midwifery research, published by Wolters Kluwer, 22 (4): 280-286.

Gouda, R. A. K. (2017). Nurses' Performance for Orthopedic Patients with Traction or Internal Fixatio. Port Said Scientific Journal of Nursing, 4(2), 193-2018.

Grondahl, W., Muurinen, H., Katajisto, J., Suhonen, R. and Kilpi, H. (2019). Perceived quality of nursing care and patient education: a cross-sectional study of hospitalized surgical patients in Finland, BMJ Open. 523-150. Available at: <https://bmjopen.bmj.com>, accessed: 12/ 3/ 2024, 8.30 P.M.

Habibzadeh, H., Khajeali, N., Khalkhali, R., Mohammad, Y. (2021). Effect of evidence-based education on nursing Students' self-efficacy. Med . Edu. Dev .J. 2021;11(4):500–17.

Hassankhani, H., Hasanzadeh, F., Powers, K., Zadeh, A., and Rajaie R. (2018). Clinical skills performed by Iranian emergency nurses: perceived competency levels and attitudes toward expanding professional roles. Journal emergency nurses, 44(2): 156-163.

Hojatollah, Y., Malihe, N., and Fakhri, S. (2022). Reviewing the effects of an educational program about sepsis care on knowledge, attitude, and practice of nurses in intensive care units Iran J Nurs Midwifery Res. 2022; 17(2): 91–95.

Hussein, R., Elshimy, H., Foad, D., Gallab, S., and Abo Elmagad, N. (2018). Effect of Clinical Pathway on Nursing Performance, Patient Outcomes and Length of Stay for Patients with Unstable Angina, IOSR Journal of Nursing and Health Science, 2018; 7 (3):51-59.

Imanipour, M., Abbas, E., Hadiseh, M .Z., Mohammad, M. M. (2021). The effect of competency based education on clinical performance of health care providers: A systematic review and meta-analysis International Journal of Nursing Practice DOI:10.1111/ijn.13003.

Karami, A., Farokhzadian, J. & Foroughameri, (2017). Nurses' professional competency and organizational commitment: Is it important for human resource management, PLOS ONE Journal, 12(11)

Kohrt, B.A, Asher, L., Bhardwaj, A., Fazel, M., Jordans, M.J.D, Mutamba, B.B., Nadkarni, A., Pedersen, G.A., Singla, D.R., and Patel, V. (2018). The role of communities in mental healthcare in low and middle income countries; a meta review of components and competencies; International journal of environmental research and public health 15.

Meretoja, R., Isoaho, H., & Leino-Kilpi, H. (2004). Nurse competence scale: development and psychometric testing. Journal of advanced nursing, 47(2), 124-133.

Mirlashari, J., Qommi, R., Nariman, S., Bahrani, N. & Begjani, J., (2016). Clinical competence and its related factors of nurses in neonatal intensive care units, Journal of Caring Science, 5(4): 317–324. doi: 10.15171/jcs.2016.033.

Notarnicola, I., Stievano, A., Barbarosa, M. R. D. J., Gambalunga, F., Iacorossi, L.,

Petrucci, C., & Lancia, L. (2018). Nurse Competence Scale: psychometric assessment in the Italian context. *Ann Ig*, 30(6), 458-469.

Pathak, I., & Ayoub-Rodriguez, L. (2021). Management of Pediatric Orthopedic Patients During the Postoperative Period. *Pediatric Orthopedics and Sports Medicine: A Handbook for Primary Care Physicians*, 259-269.

Penasales, M., Raquitico, F. and Clores, M. (2021). Experiences of operating room. nurses in promoting quality peri-operative patient care. *Clinical practice journal*, 6(2): 26-32.

Sargeant, J., Wong, B., & Campbell, C. (2018). CPD of the future: a partnership between quality improvement and competency-based education, *Wiley Online Library, Medical education*, 52(1): 125-135.

Sharghi, N., Alami, A., Khosravan, S., Mansoorian, M., and Ekrami, A. (2019).

Academic training and clinical placement problems to achieve nursing competency. *Journal of advances in medical education & professionalism*, 3(1): 15-20.

Taha, A. S., & Ibrahim, R. A. (2021). Effect of Educational Program on Nurses' Knowledge, Practices and Patients' Outcomes Post Total Knee Arthroplasty. *Evidence-Based Nursing Research*, 3(4), 16-16.

Wilson, D. (2016). The child with musculoskeletal condition. *Maternal child Nursing Care* 5th ed pp 1531-1569. London. NY: Mosby.

Young, S., Fevang, J. M., Gullaksen, G., et al. (2010). Deformity and functional outcome after treatment for supracondylar humerus fractures in children: A 5- to 10-year follow-up of 139 supracondylar humerus fractures treated by plaster cast, skeletal traction or crossed wire fixation. *Journal of Child Orthopedics*, 4, 445-453.

تأثير برنامج تدريبي على مستوى كفاءة الممرضين فيما يتعلق برعاية الأطفال الخاضعين لجراحة العظام

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تتأثر جودة الرعاية التمريضية المقدمة للأطفال الخاضعين لجراحة العظام بشكل مباشر بكفاءة الممرضين. ولذلك، يجب إجراء البرامج التدريبية القائمة على الكفاءة للممرضين لرفع جودة الرعاية التمريضية وضمان نتائج أفضل. لذلك هدفت هذه الدراسة الى تقييم تأثير برنامج تدريبي على مستوى كفاءة الممرضين فيما يتعلق برعاية الأطفال الخاضعين لجراحة العظام. وتم تطبيق هذه الدراسة على عينة مناسبة من كل الممرضين (40) وعينة غرضية من الأطفال (40) الخاضعين لجراحة العظام في قسم جراحة الأطفال بمستشفى الأطفال التخصصي ببناها. وتم تجميع البيانات باستخدام: -1- استمارة استبيان بالمقابلة وتشمل خصائص الممرضين وخصائص الاطفال ومعلومات الممرضين عن رعاية الاطفال الخاضعين لجراحة العظام. -2- إستمارة ملاحظه لأداء الممرضين فيما يتعلق برعاية الأطفال الخاضعين لجراحة العظام. -3- مقياس لمستوى كفاءة الممرضين. -4- اتجاهات الممرضين تجاه التدريب القائم على الكفاءة. وأظهرت نتائج هذه الدراسة أن معظم الممرضين لديهم مستوى معرفة مرضي، (87.5%) منهم لديهم مستوى ممارسة كفو واتجاه إيجابي. بالإضافة إلى أن (92.5%) منهم يتمتعون بمستوى كفو من الكفاءة الكلية واستنتجت هذه الدراسة ان البرنامج التدريبي أدى إلى زيادة مستوى كفاءة الممرضين فيما يتعلق برعاية الأطفال الخاضعين لجراحة العظام. وقد أوصت الدراسة بتنفيذ برامج تدريبية قائمة على الكفاءة في مختلف الأماكن لتعزيز مستوى خبرة طاقم التمريض في تقديم الرعاية للأطفال الخاضعين لجراحة العظام.